Constraining the Star Formation History within the Nearest Ultra-Diffuse Galaxy, F8D1

Benjamin Velguth[1], Adam Smercina[2], Eric Bell[1]
[1] University of Michigan, [2] University of Washington

Motivation:

- Ultra Diffuse galaxies (UDGs) are a relatively new classification of galaxy that have been observed throughout the Universe
- The proximity of F8D1 allows us to deeply analyze the stellar populations within this UDG to understand how it formed

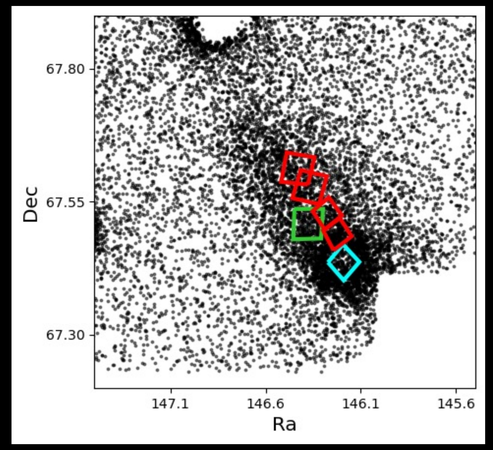

Figure 1: Six HST fields overlaid on a sky map taken by the Subaru Telescope. These were used to create the t_{90} profile along the tidal tail of F8D1. The cyan and green fields are much deeper than the four in red and were used for a full SFH fit shown in Fig. 4.

References:
Žemaitis, R., et. al. (2022). A Tale of a Tail: A Tidally-Disrupting Ultra-Diffuse Galaxy in the M81 Group. arXiv. 2209.09713
Harmsen, Benjamin et. al. (2023). Constraining the assembly time of the stellar haloes of nearby Milky Way- mass galaxies through AGB populations [Article submitted for publication].
Lamiya Mowla et al. 2017 'Evidence of Absence of Tidal Features in the Outskirts of Ultra Diffuse Galaxies in the Coma Cluster', ApJL, 851, 27
Laura V Sales et al. 2020 ' The formation of ultradiffuse galaxies in clusters', *Monthly Notices of the Royal Astronomical Society*, 494, 2
P. Bennet et al. 2018'Evidence for Ultra-diffuse Galaxy "formation" through galaxy interactions', ApJL, 866, 1
Timothy Carleton et al . 2021 'The formation of ultra-diffuse galaxies in cored dark matter haloes through tidal stripping and heating', A&A, 654, 105

Methodology:

- With six HST fields, we used the ratio of AGB to RGB stars in the main body as well as the tidal tail of the galaxy to constrain its star formation history
- Two HST fields had deep enough CMDs to perform a full SFH fit

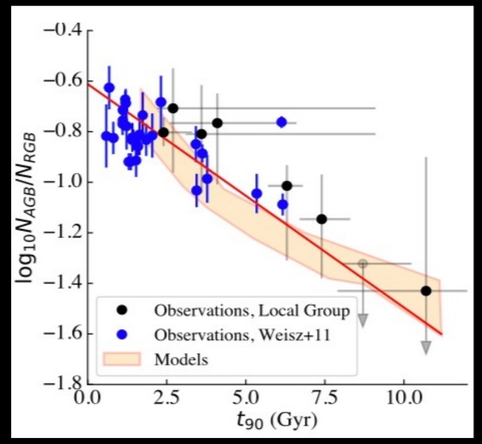

Figure 2: The relationship found by Harmsen, et. al. (2023) that was used to find the t_{90} within each of the HST fields.

Results:

- F8D1 was forming stars up until recently (< 3 Gyr ago)
- Star formation stopped almost uniformly within the entire galaxy and tidal stream, shown by the profile in Fig. 5.
- The t_{90}s calculated by the methods outlined in Harmsen, et. al. (2023) match those found by the full SFH fit

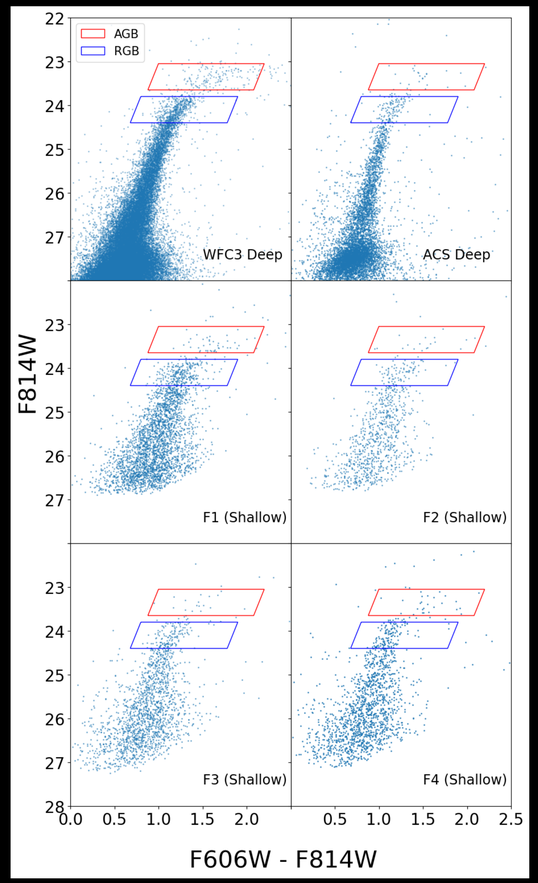

Figure 3: Six CMDs corresponding to the six fields show in Fig. 1. The selection boxes overlaid on each were used to calculate the t_{90} along the tidal tail.

Interpretation:

- The global quenching of star formation signifies that the tidal tail itself formed within the calculated t_{90} timescale
- We speculate that this tidal disruption event caused the quenching of star formation

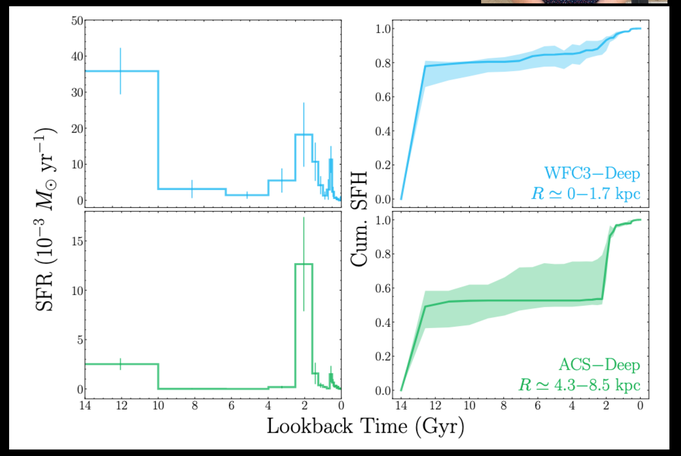

Figure 4: The full SFH fit done on the two deep HST fields, shown in cyan and green in Fig. 1.

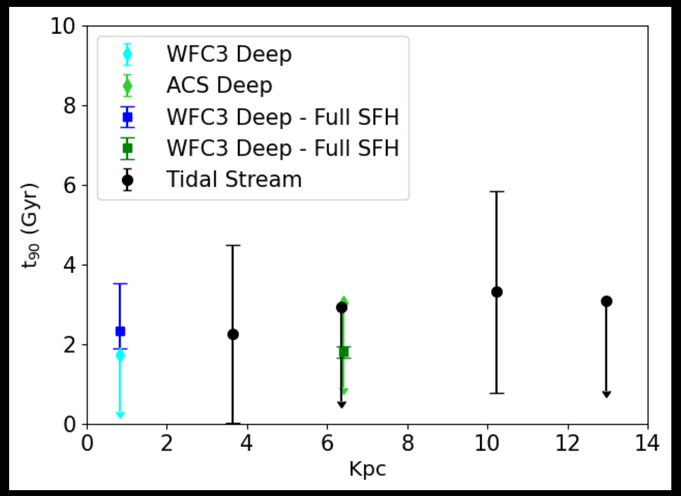

Figure 5: The t_{90}s as a function of distance from the center of F8D1. This profile is fairly consistent with a flat line at roughly 2-3 Gyr.

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